Minor conditions: Practical applications of pharmacist prescribing laws

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Disclosures

• The planners and presenter of this presentation have disclosed no conflict of interest, including no relevant financial relationships with any commercial interests
Objectives

• Describe the pathophysiology of motion sickness, lice, cold sores, and uncomplicated urinary tract infections
• Determine the differential diagnosis and referral criteria for motion sickness, lice, cold sores, and uncomplicated urinary tract infections
• Compare and contrast pharmacologic options for treatment of motion sickness, lice, cold sores, and uncomplicated urinary tract infections
• Counsel on non-pharmacologic interventions for motion sickness, lice, cold sores, and uncomplicated urinary tract infections
• Discuss workflow considerations for pharmacist prescribing in community pharmacy
• Complete an appropriate community pharmacy-based physical assessment for motion sickness, lice, cold sores, and uncomplicated urinary tract infections
Plan for today

- For each disease state:
  - Pathophysiology
  - Differential diagnosis (factors to consider for treatment and referral)
  - Physical exam refresher
  - Treatment options and patient education
  - Practice with physical exam and application to cases

- Workflow considerations
MOTION SICKNESS
Motion Sickness

• Physiologic responses to motion by sea, car, train, air, and virtual reality immersion
• Can affect all people with functional vestibular systems
• Conflicting vestibular, visual, and proprioceptive inputs
  – e.g. Looking at an apparently unmoving ship cabin wall while sensing the ship rolling
Risk Factors

• Age:
  – Children aged 2 – 12 years are especially susceptible
  – Adults > 50 years are less susceptible
• Sex:
  – Females are more susceptible
    • Pregnancy, hormone replacement, menstruation
• Poor ventilation (fumes, smoke, CO)
• Emotional factors (fear, anxiety)
• Those prone to migraine headaches
Clinical Presentation

- Characteristic manifestations:
  - N/V/retching
  - Sweating/cold sweats
  - Vague abdominal discomfort
- Other symptoms/preceding symptoms:
  - Yawning
  - Hyperventilation
  - Salivation
  - Somnolence
  - Dizziness
  - Headache
  - Fatigue
  - Confusion
Differential diagnosis

• Exclusions: Symptoms caused by factors or disease states other than motion sickness
  – e.g. concussion, vestibulopathies, vestibular migraine
  – Ototoxic drugs

• Refer if present:
  – Atypical symptoms (e.g. true vertigo; excessive vomiting)
  – Symptom onset without motion
  – New-onset motion sickness
Prevention

• Nonpharmacological interventions:
  – Acupressure
  – Avoidance of triggers
  – Optimize positioning to reduce motion or motion perception
  – Reducing sensory input
  – Limit alcoholic and caffeinated beverages
  – Avoiding smoking
  – Adding distractions
  – Adaption
Prevention

- Pharmacologic:
  - Scopolamine
  - Antihistamines:
    - Dimenhydrinate
    - Diphenhydramine
    - Meclizine
    - Cyclizine
  - Anti-dopaminergic drugs
    - Promethazine, metoclopramide
  - Ginger
Scopolamine

• Transderm-Scop®, generic
• Dose: 1.5mg/ 72 hours
• Apply 4 hours before effect is required
  – Best if 12 hours before
• Replace every 72 hours as needed
  – Remove old patch
• Adverse effects: anticholinergic
• Effectiveness:
  – Better than placebo
  – No better than antihistamines
Antihistamines

• Mechanism: likely anticholinergic
• All effective antihistamines are sedating
• Non-sedating antihistamines do not appear to be effective
• Administer 1 hour before effect is required
• Adverse effects: anticholinergic
• Effectiveness:
  – Better than placebo
  – No better than scopolamine
  – May cause more sedation than scopolamine
Antihistamines

• Dimenhydrinate (Dramamine®, Driminate™, Motion Sickness)
  – Adults, children > 12 yrs: 50-100mg every 4-6 hrs (max 400mg/day)
  – 6 to 12 yrs: 25-50mg every 6-8 hrs (max 150mg/day)
  – 2 to 5 yrs: 12.5-25mg every 6-8 hrs (max 75mg/day)
  – Chewable tablet

• Meclizine (Dramamine Less Drowsy®, Travel Sickness)
  – Adults, children > 12 yrs: 25-50mg every 24 hrs

• Diphenhydramine
  – Adults: 25-50mg every 4-8 hrs
  – Children ≥ 12 yrs: 25-50mg every 4-6 hrs
  – 6 to 11 yrs: 12.5-25mg every 4-6 hrs
  – 2 to 5 yrs: 6.25mg every 4-6 hrs
Antidopaminergic Drugs

• Usually reserved for those that fail transdermal scopolamine and antihistamines
• Potentially more sedating than antihistamines
• Side effects:
  – Anticholinergic
  – Sedation
  – Extrapyramidal effects
• Promethazine (Phenergan®)
  – Adults: 25mg, 30-60 minutes prior to departure, 25mg BID
  – Children >2 yrs: 0.5mg/kg (max 25mg), 30-60 minutes prior to departure, every 12 hours PRN
APPLICATION TO CASES
Ectoparasites

• Head lice
  – *Pediculus humanus capitis*

• Body lice
  – *Pediculus humanus corporis*
Head Lice

• Life cycle of head louse:
  – Adults: one month
  – Female lays 7-10 eggs (nits) per day
  – Nits hatch in eight days, releasing nymphs
  – Nymphs require eight days to mature

• Transmission:
  – Direct contact
  – Louse do not fly, jump or use pets as vectors
Lice Presentation

• Chief complaint: scalp pruritus
  – Caused by reaction to louse saliva
  – If first infestation, sensitivity to saliva may take 4-6 weeks to develop
• Tickling sensation
  – “Something moving on head”
• Asymptomatic
• Primary finding: nits at proximal end of hair shafts
  – Height of nits above scalp indicates duration of infestation
    • 1 cm = 1 month
Differential diagnosis

• Itching not always present and not a sure-fire indicator of head or body lice

• Scalp:
  – Seborrheic dermatitis
  – Atopic dermatitis
  – Dandruff
  – Key: Presence of nits near to scalp or live lice

• Body:
  – Scabies
  – Atopic or contact dermatitis
  – Secondary pruritis
  – Key: Presence of nits or live lice on body or clothing
Physical exam findings

• Scalp: Distinguish nits from hair casts (seborrheic dermatitis, psoriasis) and piedra
  – Nits difficult to dislodge
  – Looking for multiple nits within ¼ inch from scalp

• Body: Distinguish from scabies (scabietic burrows, erythema)
  – Co-infection possible (refer)
Lice (head)

Images source: UpToDate [website on the internet]; Goldstein AO et al. Pediculosis Capitis
Physical exam refresher

- Equipment: Magnifying glass, nit comb, comb, and gloves
- Inspection (Body lice and nits): Examine along seams of clothing
- Wet comb: Apply hair lubricant (e.g. conditioner), comb or brush hair to remove tangles, comb hair with nit comb, examine comb after each stroke, repeat nit comb for entire scalp
TREATMENT
Treatment Overview

• Guidelines: The American Academy of Pediatrics
• Confirm presence of living lice
• Nits > 6.5mm from the scalp w/o nymphs or adults?
  – Treatment not necessary
• Topical pediculicides are the most common initial treatments
• Wet combing is sometimes used as an alternative
• Oral pharmacologic therapy if refractory
• Do not need to withhold children from school!!
• Treat family members
• Wash clothing/ bedding in hot water
FDA Approved Treatment Options

• Permethrin 1% (Nix®, Nix creme rinse®)
• Pyrethrins 0.3%/piperonyl butoxide 4% (RID®)
• Malathion 0.5% (Ovide®)
• Ivermectin (Sklice®)
• Spinosad (Natroba®)
Permethrin 1% (Nix, Nix creme rinse)

- Synthetic pyrethroid
- Less allergenic than pyrethrins
  - Ok to use if patient has chrysanthemum allergy
- Reported adverse effects:
  - Pruritus
  - Erythema
  - Edema
Permethrin 1% (Nix, Nix creme rinse)

• Directions:
  – Shampoo hair, towel dry, apply rinse to hair, leave on x 10 minutes, rinse
  – Remove nits with nit comb
  – Repeat if live lice after 7-10 days of initial therapy
    • 9 days is preferred based on the life cycle of lice
Pyrethrins 0.3%/piperonylbutoxide 4% (RID)

- Manufactured from chrysanthemum
  - Avoid if allergy to chrysanthemum or “plants”
- Available in shampoo or mousse formulations
- Directions:
  - Apply to dry hair, leave on for 10 minutes, rinse
- No residual pediculicidal activity after washing:
  - 20%-30% of eggs remain viable after treatment
  - Will likely need to repeat in 7-10 days
- Efficacy has decreased substantially due to resistance
Malathion 0.5% (Ovide)

- Organophosphate (cholinesterase inhibitor)
- Highly ovicidal
  - Single application usually sufficient
- Consider use if pyrethroid resistance present
- Directions:
  - Apply lotion to dry hair, allow hair to dry, rinse after 8-12 hours, shampoo hair and rinse, use a nit comb
  - May repeat in 7-9 days
- Concerns:
  - Highly flammable (78% isopropyl alcohol)
    - Avoid hair dyers, curling irons and smoking
  - Contraindicated in children < 2 yrs
Ivermectin 0.5% Lotion (Sklice®)

- Anthelmintic agent
- Increases chloride ion permeability of muscle cells
  - Paralysis and death of lice
- Generally well tolerated
  - Potential ocular irritation, dry scalp, burning sensation
- Directions:
  - Apply to dry hair and scalp, rinse after 10 minutes
  - Only need one application
Spinosad (Natroba)

- Spinosyn A + spinosyn D (5:1)
- Broad spectrum of activity against many insects
- Ovicidal and pediculicidal
- Appears to be more effective than permethrin
  - Cure rate at 14 days: 84.6% vs. 44.9% (NNT 3)
- Directions:
  - Apply to dry hair, saturate scalp and work outward
  - Rinse 10 minutes after application
  - May repeat in 7 days if live lice present
Choosing an Agent

• Resistance patterns
• Age restrictions
• Cost
• Application requirements
  – Malathion must be left in for 8-12 hours
• Malathion is malodorous
• Malathion is flammable and may cause respiratory depression if ingested
# Topical Pediculicides

<table>
<thead>
<tr>
<th>Product</th>
<th>Availability</th>
<th>Formulations</th>
<th>Age Restrictions</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permethrin (Nix®)</td>
<td>OTC</td>
<td>liquid or lotion</td>
<td>&lt; 2 months</td>
<td>$</td>
</tr>
<tr>
<td>Pyrethrins + piperonyl butoxide (Rid®)</td>
<td>OTC</td>
<td>Shampoo or mousse</td>
<td>&lt; 2 years</td>
<td>$</td>
</tr>
<tr>
<td>Malathion (Ovide®)</td>
<td>Rx</td>
<td>Lotion</td>
<td>&lt; 6 years</td>
<td>$$$$</td>
</tr>
<tr>
<td>Ivermectin (Sklice®)</td>
<td>Rx</td>
<td>Lotion</td>
<td>&lt; 6 months</td>
<td>$$$$</td>
</tr>
<tr>
<td>Spinosad (Natroba®)</td>
<td>Rx</td>
<td>Suspension</td>
<td>&lt; 6 months</td>
<td>$$$$</td>
</tr>
</tbody>
</table>
APPLICATION TO CASES
COLD SORES (HERPES LABIALIS)
Herpesviruses Overview

• Eight types of herpesviruses that infect humans
• All herpesviruses remain latent within specific host cells
  – May subsequently reactivate at any time
• Do not survive long outside of host:
  – Transmission usually requires intimate contact
  – Virus can reactivate without causing symptoms
    • Asymptomatic shedding
# HSV Types

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Other Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSV 1</td>
<td>Human herpesvirus 1</td>
</tr>
<tr>
<td>HSV 2</td>
<td>Human herpesvirus 2</td>
</tr>
<tr>
<td>Varicella-zoster</td>
<td>Human herpesvirus 3</td>
</tr>
<tr>
<td>Epstein-Barr</td>
<td>Human herpesvirus 4</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td>Human herpesvirus 5</td>
</tr>
<tr>
<td>Human herpesvirus 6</td>
<td>Roseola infantum</td>
</tr>
<tr>
<td>Human herpesvirus</td>
<td>Roseola infantum</td>
</tr>
<tr>
<td>Kaposi sarcoma</td>
<td>Human herpesvirus 8</td>
</tr>
</tbody>
</table>
Oral Herpes

• Primarily caused by HSV1
  – Can be caused by HSV2, although less frequent
• Rash of skin and mucous membranes (primarily lips)
• Prodrome of tingling, itching, and burning
  – Oral and perioral lesions
• Contagious to those not previously infected, immunosuppressed
• Primary outbreak: herpetic gingivostomatitis
• Recurrent episodes: herpes labialis
Differential diagnosis

• Inclusion/exclusion from BOP (see handout)
• Differentiate from:
  – Aphthous ulcers (canker sores)
  – Bacterial pharyngitis (strep throat)
  – Syphilis (chancre is typically painless)
  – Stevens-Johnson Syndrome
  – Herpes infection somewhere other than mouth
Physical exam findings

• Location
• Appearance
• Past medical history
Non-HSV-1 Mouth Sores
TREATMENT OPTIONS
Management Overview

• Education:
  – Contagious nature of virus
  – Modes of transmission

• Self-limited infection: treatment needed?

• Antiviral medications?
  – Immunocompromised or frequent outbreaks
  – Moderate-severe cases of primary infection
  – May improve symptoms and prevent recurrence
    • Do not cure infection (lifelong latency)
Management Overview

• Prompt initiation of antivirals:
  – Within 48-72 hours

• Potential benefits:
  – Fever reduction (1 vs 3 days)
  – Shorten duration ~ 1 day
  – Reduced viral shedding (1 vs 5 days)

• Strategies:
  – Episodic therapy
  – Chronic suppressive therapy
  – No treatment
Antivirals

• Acyclovir (Zovirax®)
• Valacyclovir (Valtrex®)
• Famciclovir (Famvir®)
• Mechanism of action:
  – Inhibit replication of human herpesviruses
  – Inhibit viral DNA synthesis
Acyclovir Mechanism of Action

https://www.hiv.uw.edu/page/qb/question/basic-primary-care/cutaneous-manifestations/2
Acyclovir (Zovirax®)

• Pharmacokinetics:
  – Renally eliminated (dose adjustment required)
  – Low bioavailability

• Adverse effects:
  – Nephrotoxicity: ↑BUN/SCr, crystallization in renal tubules
    • Hydration is key
  – GI: N/V, ↑LFTs
  – Neurotoxicity: lethargy, tremors, confusion, hallucinations, seizures
Valacyclovir (Valtrex®)

• Prodrug of acyclovir → converted to acyclovir
• Pharmacokinetics:
  – Renally eliminated
  – Better bioavailability over acyclovir
  – Longer half-life than acyclovir
• Adverse effects:
  – Headache, dizziness, depression
  – GI: N/V, diarrhea
  – Renal toxicity (less than that of acyclovir)
Famciclovir (Famvir®)

- Rapidly converted to active compound - penciclovir

**Pharmacokinetics:**
- Renally eliminated
- Better bioavailability over acyclovir
- Longer half-life than acyclovir

**Adverse effects:**
- Headache, dizziness, fatigue
- GI: N/V, diarrhea
HSV-1 Topical Treatment

- Acyclovir (Zovirax®)
  - Apply 5x/day x 4 days
- Acyclovir + hydrocortisone 1% (Xerese®)
  - Apply 5x/day x 5 days
  - Hydrocortisone to decrease inflammation
- Penciclovir (Denavir®)
  - Apply every 2 hours while awake x 4 days
- Docosanol 10% (Abreva®)
  - Apply 5x/day until lesions healed (max 10 days)
  - Efficacy similar to topical antivirals
  - Blocks virus from entering cells
Episodic Treatment

• Must be initiated quickly!

• Oral:
  – Acyclovir: 200 or 400mg **five times** daily x 5 days
  – Valacyclovir: 2g twice daily x 1 day
  – Famciclovir: 750mg twice daily x 1 day or 1500mg as a single dose

• Topical:
  – Benefit = modest
  – Must be applied at first sign of symptoms
What can pharmacists prescribe for?

- Active cold sore
- Short-term prevention
APPLICATION TO CASES
UNCOMPLICATED URINARY TRACT INFECTION
Background

• Epidemiology:
  – Affects ~150 million people worldwide annually
  – ~50% of women will have a UTI in their lifetime
  – 25% of women with first episode of cystitis report recurrent UTI within 6 months

• Incidence:
  – 15.2% for women aged 17-39
  – 11.4% for premenopausal women (aged 40-59)
  – 9.7% for postmenopausal women (aged 60-79)
Risk Factors

- Sexual intercourse
- Spermicide use
- Diaphragm contraception use
- Frequent or recent sexual activity
- Previous UTI
- Family history of UTI in first-degree female relative
- Increasing parity
- Diabetes mellitus
- Postmenopausal
- Others
Pathogenesis

- Female urethra is short, external one third is often colonized
- Bacteria from bowel or vagina colonize periurethral mucosa
- Bacteria ascend through the urethra to bladder
  - Can ascend to the kidneys (pyelonephritis)
- Once in the bladder, bacteria can colonize and cause infection
- Pathogens:
  - *Escherichia coli* causes 75-95% of uncomplicated UTIs
  - *Klebsiella pneumoniae*
  - *Enterococcus faecalis*
  - *Proteus mirabilis*
  - *Staphylococcus saprophyticus*
  - *Streptococcus agalactiae*
Signs and Symptoms

- Dysuria
- Frequency
- Urgency
- Suprapubic pain
- Gross hematuria – less common
- Dysuria + frequency w/o vaginal discharge = highly predictive
  - Probability > 90%
Differential diagnosis

• Inclusion/exclusion from BOP (see handout)
• Differentiate from:
  – Complicated UTI
  – Pyelonephritis or systemic illness
  – Pelvic inflammatory disease
  – Sexually transmitted disease
• Eliminate possibility of pregnancy
Physical exam findings

• Eliminate:
  – Symptoms suggesting anything other than uncomplicated UTI
  – Systolic hypotension (<100mmHg)
  – Tachypnea (>25 breaths per minute)
  – Tachycardia (>100 BPM)
  – Oxygenation <90%
  – Body temperature >103° F
Physical exam refresher

• Vitals
  – Breaths per minute
    • Assess alone or with pulse
    • Watch sternum
    • Count inhalations for 20 seconds (x3) or 30 seconds (x2)
  – Pulse oximetry
    • Devices
    • Potential sources of error
  – Pulse
    • Taken with pulse oximetry and automated BP cuff
    • Refer to handout for refresher on manual pulse confirmation
Physical exam refresher

• Temperature
  – Selection of type of thermometer
    • Oral
    • Aural/Tympanic
    • Temporal
  – Legal considerations
• Example thermometer uses
Physical exam refresher

• Blood pressure devices
  – Meter selection
  – Cuff selection

• Blood pressure measurement
  – Patient positioning
  – Obtaining the measurement
  – Refer to handout for refresher on manual blood pressure assessment
Treatment Guidelines

• Guidelines:
  – Infectious Disease Society of America:
    [https://academic.oup.com/cid/article/52/5/e103/388285#74161261](https://academic.oup.com/cid/article/52/5/e103/388285#74161261)
    • Published March, 2011
  – American College of Obstetricians and Gynecologists:
    [https://www.acog.org/-/media/Practice-Bulletins/Committee-on-Practice-Bulletins----Gynecology/Public/pb091.pdf?dmc=1&ts=20170908T1409079422](https://www.acog.org/-/media/Practice-Bulletins/Committee-on-Practice-Bulletins----Gynecology/Public/pb091.pdf?dmc=1&ts=20170908T1409079422)
    • Published March, 2008
Treatment Overview

• Choice should be individualized:
  – Allergies, resistance patterns, availability, cost
• Prescribe a **recommended** antimicrobial:
  – Nitrofurantoin monohydrate/macrocryystals
  – Trimethoprim-sulfamethoxazole
  – Fosfomycin
• If a recommended antimicrobial cannot be prescribed:
  – Fluoroquinolones
  – β-lactams
Refer

**Woman with acute uncomplicated cystitis**
- Absence of fever, flank pain, or other suspicion for pyelonephritis
- Able to take oral medication

**Yes**

Can one of the **recommended antimicrobials** below be used considering:
- Availability
- Allergy history
- Tolerance

Nitrofurantoin monohydrate/macrocrystals 100 mg bid X 5 days
  (avoid if early pyelonephritis suspected)
  OR
Trimethoprim-sulfamethoxazole 160/800 mg (one DS tablet) bid X 3 days
  (avoid if resistance prevalence is known to exceed 20% or if used for UTI in previous 3 months)
  OR
Fosfomycin trometamol 3 gm single dose
  (lower efficacy than some other recommended agents; avoid if early pyelonephritis suspected)
  OR
Pivmecillinam 400 mg bid X 5 days
  (lower efficacy than some other recommended agents; avoid if early pyelonephritis suspected)

**No**

Fluoroquinolones
  (resistance prevalence high in some areas)
  OR
  β-lactams
  (avoid ampicillin or amoxicillin alone; lower efficacy than other available agents; requires close follow-up)

**Yes**

Prescribe a recommended antimicrobial

*The choice between these agents should be individualized and based on patient allergy and compliance history, local practice patterns, local community resistance prevalence, availability, cost, and patient and provider threshold for failure (see Table 4)*
Nitrofurantoin

• Dose:
  – Nitrofurantoin monohydrate/macrocrystals (Macrobid®)
    • 100mg BID x 5 days
  – Nitrofurantoin monohydrate (Macrodantin®)
    • 50-100mg every 6 hours x 5 days

• First line agent
  – Minimal resistance and propensity for collateral damage

• Does not cover *P. mirabilis*

• Not effective for pyelonephritis
Nitrofurantoin

• Avoid if CrCl < 30 mL/minute
• Adverse effects:
  – Discolors the urine brown
  – N/V/D
    • Macrocystaline preparation is better tolerated
  – Acute pneumonitis
    • Fevers, chills, cough, dyspnea, chest pain, pulmonary infiltration, eosinophilia
    • May occur within hours-days
    • Symptoms usually resolve after discontinuation
  – Interstitial pulmonary fibrosis
    • Chronic therapy
Trimethoprim-Sulfamethoxazole (Bactrim®)

• Dose:
  – 160/800mg (1 DS tablet) BID x 3 days
• Avoid if:
  – Local resistance rates ≥20%
  – Used for UTI within the previous 3 months
  – Concomitant ACE-I or ARB therapy
    • Increase in serum K+ → cardiac dysrhythmias, sudden cardiac death
  – Drug interactions
    • Inhibits CYP2C9, CYP2C8; substrate of CYP2C9 (major)
    • Warfarin: Potential three-fold increase in INR
Trimethoprim-Sulfamethoxazole (Bactrim®)

- Adverse effects:
  - N/V/D
  - Renal: hyperkalemia, interstitial nephritis, acute tubular necrosis
  - Photosensitivity/ Stevens-Johnson
  - Drug-induced hepatitis
  - Aseptic meningitis
  - Drug interactions
Fosfomycin (Monurol®)

- **Dose:**
  - 3g as a single dose
- **First line agent**
  - Minimal resistance and propensity for collateral damage
- **Activity against VRE, MRSA, ESBL producing Gram negative rods**
- **Efficacy: compared to other 1st line agents**
  - Clinical cure rates comparable
  - Bacterial efficacy rates slightly lower
- **Not uniformly available**
- **Susceptibility data not uniformly available**
Fosfomycin (Monurol®)

• Administration:
  – Mix with 3-4oz (90-120 mL) of cool water
  – Do not administer in dry form or mix in hot water
  – Orange flavored

• Adverse effects:
  – Diarrhea > nitrofurantoin
  – Headache
  – Dizziness
  – Hypokalemia
  – Large sodium load: 14.4 mEq of sodium/gm of fosfomycin
OPTIONS IF PREFERRED AGENTS ARE NOT APPROPRIATE
β-Lactams

- **Agents:**
  - Amoxicillin-clavulanate (Augmentin®) 500mg BID
  - Cefdinir (Omnicef®) 300mg BID
  - Cefpodoxime (Vantin®) 100mg BID
  - Cefadroxil (Duricef®) 500mg BID
  - Others

- **Duration:** 5-7 days

- **Avoid ampicillin and amoxicillin:** high rates of resistance

- **Alternative agents:**
  - **Efficacy:** lower clinical cure rate in clinical trials
  - **More adverse effects** as compared to other first line agents
    - N/V/D, rash, urticaria
Fluoroquinolones

- **Agents:**
  - Ciprofloxacin 250mg BID or 500mg ER every day
  - Levofloxacin 250mg every day
  - Ofloxacin 200mg BID

- **Duration:** 3 days

- **Alternative agents:**
  - Propensity for collateral damage
  - Increasing rates of resistance
  - Should be reserved for important uses other than cystitis
  - Adverse drug events
  - Drug interactions
Fluoroquinolones

• “The U.S. Food and Drug Administration is advising that the serious side effects associated with fluoroquinolone antibacterial drugs generally outweigh the benefits for patients with acute sinusitis, acute bronchitis, and uncomplicated urinary tract infections who have other treatment options”

• Warnings:
  – Aortic dissection/rupture
  – Hypoglycemia
  – Tendonitis/tendon rupture
  – Peripheral neuropathy
  – CNS effects
<table>
<thead>
<tr>
<th>Agent</th>
<th>Dose</th>
<th>Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrofurantoin macrocrystals</td>
<td>100mg BID x 5 days</td>
<td>Urine discoloration, anorexia, nausea, vomiting, hypersensitivity, peripheral neuropathy, hepatitis, hemolytic anemia, and pulmonary reactions</td>
</tr>
<tr>
<td>Nitrofurantoin monohydrate</td>
<td>50-100mg every 6 hours x 5 days</td>
<td></td>
</tr>
<tr>
<td>Fosfomycin</td>
<td>3g as a single dose</td>
<td>Diarrhea, nausea, vomiting, rash, and hypersensitivity</td>
</tr>
<tr>
<td>Trimethoprim-sulfamethoxazole</td>
<td>160/800mg (1 DS tablet) BID x 3 days</td>
<td>Fever, rash, photosensitivity, neutropenia, thrombocytopenia, anorexia, nausea and vomiting, pruritus, headache, urticaria, Stevens–Johnson syndrome, and toxic epidermal necrosis</td>
</tr>
<tr>
<td>Amoxicillin-clavulanate</td>
<td>500mg BID</td>
<td>Nausea, vomiting, diarrhea, hypersensitivity, rash, urticaria</td>
</tr>
<tr>
<td>Cefdinir</td>
<td>300mg BID</td>
<td></td>
</tr>
<tr>
<td>Cefpodoxime</td>
<td>100mg BID</td>
<td></td>
</tr>
<tr>
<td>Cefadroxil</td>
<td>500mg BID</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>250mg BID x 3 days</td>
<td>Rash, confusion, seizures, restlessness, headache, severe hypersensitivity, hypoglycemia, hyperglycemia, Achilles tendon rupture, aortic dissection, peripheral neuropathy</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>250mg once daily x 3 days</td>
<td></td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>200mg BID x 3 days</td>
<td></td>
</tr>
</tbody>
</table>
APPLICATION TO CASES
WORKFLOW CONSIDERATIONS FOR COMMUNITY PHARMACIES
Workflow considerations

• Form considerations
  – Patient intake
  – Patient assessment
  – Referral
  – Follow-up and communications with PCP

• Physical workflow considerations
  – Do all patients come to patient evaluation room?
  – Who takes what actions when during workflow? (What can technicians handle, what must be done by pharmacist?)